Net-Zero IIT

The Net-Zero IIT Town House

Project Summary

The Net-Zero IIT townhouse is designed to be an affordable, energy efficient, and healthy home located in Chicago, IL. The interdisciplinary design team, made up of architects and engineers, will apply building science principles to achieve a solution that is high-performance, cost-efficient, structurally sound, and aesthetically pleasing. The design will meet both the requirements of the DOE Zero Energy Ready Home as well as the International Energy Conservation Code (IECC) 2012.

Relevance of Project to the Goals of the Competition

By designing the Net-Zero IIT townhouse with this interdisciplinary team, students will uniquely gain the applied knowledge to develop into the next generation of residential design professionals with building science expertise. By integrating the Race to Zero design competition into coursework, applied building science education will be enhanced at IIT.

Design Strategy and Key Points

In order to achieve the goals of designing an affordable, energy efficient, and healthy home, the following design strategies will be utilized:

- Integrated Design: An interdisciplinary team of architects and engineers will work in tandem to develop the form, function, and aesthetics of the home.
- Energy conservation and optimization: The team will utilize building energy simulation and optimization software (BEopt with EnergyPlus) to perform energy modeling in the early stages of the design phase. The same tools will also be used to optimize for cost Net-Zero IIT townhouse effective combinations of energy efficiency construction features and on-site renewable energy supply systems.
- Building enclosure: The building enclosure will follow Passive House design standards and will be designed using thermal-bridging free construction.

Project Data

- Location: Chicago, IL
- ASHRAE climate zone 5
- Area: 2,280 sq. ft/unit (total of 4 units)
- 4 bedrooms, 2 bathrooms, and 2 stories per unit
- HERS score: 37 w/o PV; -3 w/ PV
- Estimated monthly energy cost: $58/unit w/o PV; $4/unit w/ PV

Technical Specifications

- Wall Insulation = R-56 (Cavity insulation + continuous insulation) and Foundation Insulation = R–50
- Roof Insulation = R–63
- Window Performance = U–0.17 SHGC: 0.27
- HVAC specifications = SEER 22 and HSPF 10.0 mini-split heat pump